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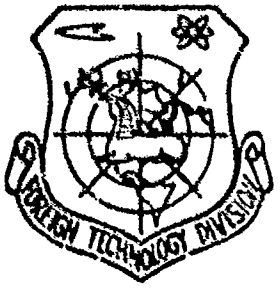
CHINA'S BALLISTIC MISSILE PLANS

by

Ma Ke, Wei De Yuan Zuo



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CHINA'S BALLISTIC MISSILE PLANS

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The Swiss magazine International Defense Review ran an article in its No. 8 for 1980 which discussed the development of China in the area of the test production of ballistic missles and satellite lifting rockets. This article has been edited and translated below as an offering for our readers. We do not offer this translation with the intent of expressing the views of the Comrade Editors of this magazine or to verify the contents of the report. We offer it for the sole purpose of giving our readers some foreign material concerning China's aviation and space development for purposes of discussion.

Early in 1944 the intelligence organizations of the Communist Party of China had already learned that the United States was in the midst of test producing the atomic bomb. After the first of this new type of weapon, and after the war with the appearance of reports concerning the German V-2 rockets, it became clear to the Communist Party of China that these new technologies were going to become a severe danger to their safety. Because of this, after the seizure of political power, New China certainly needed to acquire a thorough mastery of these new technologies in order to defend their nation and safeguard its independence.

Because of this, the relevant agencies in China undertook a mission to make Chinese who were receiving technological training in the West to include those specializing in the fields of missiles and nuclear weapons return to China. As a first step, the agencies involved came up with a list of over two hundred names. These were all Chinese with foreign citizenships who were working in engineering, physics and mathematics positions. Beginning from 1946 and with an increase in tempo in 1947, very detailed and thorough work was done in order to make these Chinese with foreign citizenships return to China.

CHINA STARTS TO TEST PRODUCE MISSILES

During the process of Chinas setting up a military and industrial base, the Soviet Union supplied what was called "selfless and generous" support. However, the Soviets were always concerned with keeping a monopoly on the latest operational systems, and this produced contradictions. What the Chinese got was a group of items which would need to be eliminated in the future, and the Chinese strongly wished to obtain some more advanced equipment. At one time, the Chinese students

at a Soviet training school--when there were no Soviet supervisory personnel around--made observations of a V750VK ground-to-air missile for several hours. This incident made the Soviets furious, and they sent the students home. In 1950, in the airspace over Jinmen and Ma Zu, a Chinese MIG and an American F-86 Saber Jet from Taiwan had a dogfight, and, by accident, an American AIM-9 air-to-air missile hit its target but did not explode. This missle was later sent to the Soviet Union; however, several of the key parts of it were taken by the Chinese. At that time, the Soviet Union was in the process of test producing a model K-13A missile of the same kind. The components which the Chinese kept were the ones which the Soviets needed, and the lack of them had quite an effect on the test production of the Soviet missile.

In the ballistic missle area, the Soviets were even more secretive. The latest model the Chinese were able to get a hold of was the SS-2 "Comrade" missle. This missile was basically a version of the V-2 which had been somewhat increased in speed and size. Its engine was of the RD 101 type. The thrust of this engine was forty three tons; its fuel was liquid oxygen and 92.5% ethanol, and its thrust lasted two hundred and thirty eight seconds. This type of missle was actually no more advanced than the types of equipment with which Chinese scholars had become familiar in the United States earlier. However, the Chinese had produced a rocket fuselage, some installation tools and training methods. This formed a starting point for the independent test production of Chinese missiles.

Because of the fact that the Soviets daily suspected more and more strongly that the Chinese were independently developing nuclear weapons and missiles, they stopped supplying materials and technology to China. Kruschev decided to refuse to supply to China examples of atom bombs which had already been promised thus breaking one of the cornerstone provisions upon which the Sino-Soviet alliance had been based. Not long after that, in June of 1959, aid in the field of advanced technology was also completely cut off.

In this period, the Chinese began the test production of a type of engine with seventy tons of thrust to serve as a basis for expanding China's ballistic missile plans. This type of engine could, if need be, be hooked up in series or parallel-type arrangements and burned storable fuels. By the use of this type of engine, it was possible for the Chinese to make a complete series of ballistic missiles and launch vehicles for space flights. This was similar to the method the United States had used in its development of similar vehicles. In the United States the twenty seven ton B-2 rocket motor went from the Redstone missile through further development to become the sixty eight ton thrust motor which was used in the Thor

Jupiter, Atlas, Titan I and other similar ballistic missiles.

The first series of missiles which the Chinese programmed was as presented below (see the appended Table 1).

(1) Single engine missiles (seventy tons of take off thrust).

These were a type of medium range ballistic missiles (MRBM) which had a take off weight of 25 tons. They were similar to the Soviet SS-3 missiles, and the Chinese probably already had some understanding of this missile before the break with Moscow. As was the case with the SS-3 before it, the SS-4 which followed had an engine which burned a storable propellent, and, for this propellent, the Chinese chose nitrogen tetroxide and a methyl compound. Because of this, the range was capable of reaching 1,800 km, and the missile could carry a one-ton fission warhead. The U.S. Department of Defense designates this missile the CSS-1.

(2) Double Engine Missiles (160 tons of lift thrust)

This is a type of intermediate range ballistic missile (IRBM), and it is not much different from the U.S. Thor and Jupiter missiles or the Soviet SS-5. Its lift off weight is 50 tons; its range is 2800 km, and it is carable of carrying a two-ton thermonuclear warhead (The U.S. designation for this is CSS-2).

(3) 4+1 Engine Two-stage Missiles (280 tons of lift off thrust)

This is a type of intercontinental ballistic missile (ICBM), and it is similar to the Soviet SS-9 or the U.S. Titan II missiles. Its take off weight is two hundred tons; its range is over ten thousand km, and it is capable of carrying two-ton thermonuclear warheads (The U.S. designation for this is CSS-4).

FROM THE TEST PRODUCTION OF MISSILES TO THE LAUNCHING OF SATELLITES

Even though the resources of China are limited, this development plan is still going forward at a very fast pace; moreover, the Chinese have advanced an even more agressive plan for the development of nuclear warheads. In the six years following the break off of relations with the Soviet Union, the Chinese had solved the following problems one after the other, that is, the production and protection of poisonous storable new forms of propellent; after using these new types of propellent forms, there was an increase in the capabilities of the WD-101 engine; and, the Chinese were able to take all the component parts and put them together into a strengthened missile fuselage, and so on and so on. On the 27th of October, 1966, China launched the initial version of the CSS-1 missile. It carried one twenty to thirty kiloton range fission warhead a range of six hundred fifty kilometers and hit a target in the Lopnor area. The Cultural Revolution

seems not to have had a very large impact on this top priority missile program. By the end of 1969, the test production of missiles and engines was successfully completed, and preparations for going into production were finished.

On the 1st of November, 1969, China launched its first satellite precisely to announce this newly acquired type of capability. The launch vehicle for this satellite was created from a CSS-1 or CSS-2 missile unto which was added a second stage of limited capabilities; this type of arrangement was similar to the early U.S. Juniter-C and Juno launch vehicles. However, this time the launch failed, and the satellite did not enter orbit. On the next try, success was finally achieved on the 24th of April, 1980.

Judging from the orbit of that satellite, all resources available at that time were used in the production and test production of the missile involved. The CSS-1 took the form of the Soviet SS-2 which permitted the additional use of several of the structural patterns from that missile. Its base diameter was 1.6 meters, and the front of the fuselage was tapered to a point. It was equipped with carbon rudders used in order to adjust the direction of thrust, and the directional gear was stowed in empty spaces between the propellent storage containers. When the CSS-1 was deployed, it required a large truck as well as several supplementary fuel vehicles, and its launch preparations required a lot of time.

The CSS-2 was a "great leap" toward a modern type of missile. Its diameter was increased by fifty percent to 2.4 meters. This is approximately the same as the diameter of the Thor and SS-5 missiles. The diameter of the rocket remained constant in an axial direction, and turnable engines or movable rudders were used to adjust the direction of thrust. This missile is capable of carrying a three megaton range warhead. The CSS-2 is deployed in hardened underground missile silos, and it is stored already fueled, so its response time is much shorter than that of the CSS-1.

The first flight tests for CSS-2 were in 1969. At that time, the CSS-1 had just gone into production. After a few limited test flights, the CSS-2 also began to go into production in 1972. Through the entire decade of the 1970's, the CSS-1 and CSS-2 were in simultaneous production.

In about this period, the question of designing a CSS-3 came up. However, because of a shortage of manpower, finances and material resources, in the decade of the 1970's, the production of large rocket motors was only able to reach 12 ~ 15 a year. One CSS-4 missile required five engines of this kind, and, because of this fact, it is obvious that the number of rocket engines being produced was in-

sufficient." Besides this, there may have been some problems with the guidance of the missile which needed to be solved, and, without a solution of these problems, it was not possible for China to have a reliable intercontinental missile. Finally, by going through some effective diplomatic maneuvering, the threat from the United States ceased to exist, and the United States was one of the likely targets for this type of missile. Because of all this, the CSS-3 was temporarily stopped."

Actually, what the CSS-3 was really supposed to be has never been clear. The greatest liklihood is that it is formed from the addition of a second stage to a CSS-2 missile. Whatever it may be, at the end of 1980, it gave China an experimental capability of launching a three megaton range warhead more than 6,500 km. By the

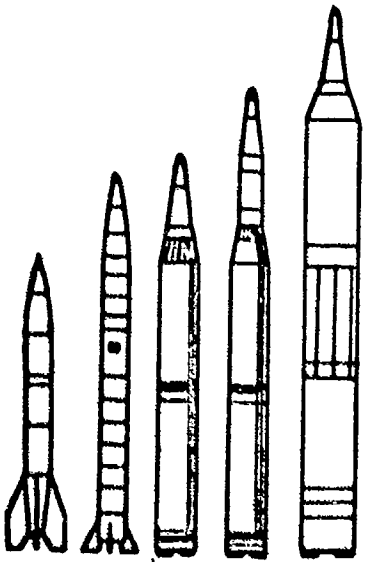


Fig 1

External Missile Form Chart . From left to right these are: the Soviet SS-2, and the Chinese CSS-1, CSS-2, CSS-3 and CSS-4.

end of 1975, there were at least three deployment silos for this type of missile finished. This gave a shock to U.S. intelligence agencies; however, none of these silos has ever been fitted with a missile.

Despite the fact that guidance and production limitation problems initially blocked the two hundred ton CSS-4's being deployed as an intercontinental ballistic missile, it has been possible to use it to launch satellites. From 1975 to 1978 the CSS-4 launched a series of five military reconnaisance satellites in the weight range of 2000 kg. Among these, the first and third satellites launched in 1975

were not recoverable. The other three satellites, launched in the winters of 1976, 1977 and 1978 were all recoverable. These recoveries were carried out at two locations. It is very obvious that these satellites could be used to understand the photographic reconnaisance satellites which the military in other countries had deployed; moreover, these satellites were also capable of carrying living organisms. (See the appended Table 2)

With the exception of the Soviet SS-18, the CSS-4 is the world's largest missile. However, the efficiency of its engines is quite low, and its payload capabilities are smaller by half than those of the Titan II (Its thrust time is 280-290 seconds and is comparable to the 310 seconds for the storable liquid fuel rockets in the Soviet Union and the United States). Because of this, the overall performance of this missle is not much different from that of the Atlas missile.

CHINA'S FUTURE PLANS

Due to production limitations, China cannot help but alternately develop missiles and its space program because she cannot do both at the same time. From 1971 to 1975, the production of the CSS-1 and CSS-2 hit its peak; this was due to the fact that there were no satellite launchings. From 1975 to 1978, the focal point was the launching of military reconnaisance satellites, and, because of this the CSS-3 was deemphasized. The production levels for the CSS-1 and CSS-2 also went down.

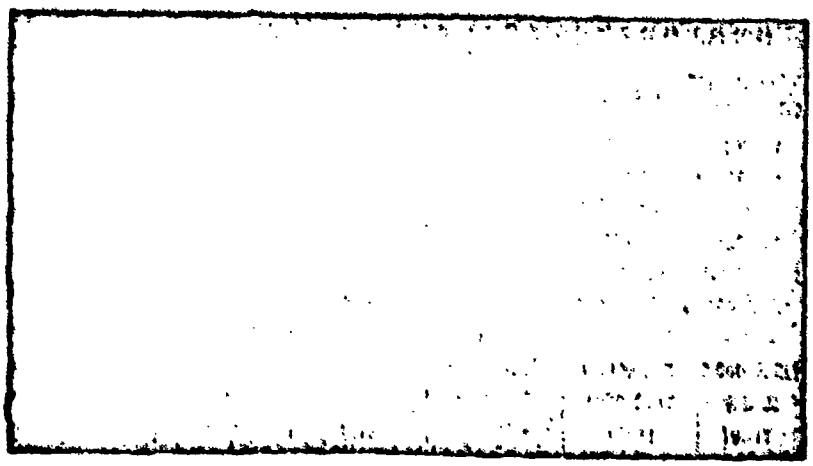
Beginning with 1979, the emphasis on space flight was also temporarily stopped, and the emphasis was put on military production once again. By May of 1980 the reason for the this temporary halt became clear since, at that time, China carried out two tests of the CSS-4 missile in succession. It seems that in deploying this latest type of missile, if the pace is relatively slow, then it will require two or three years before the deployment can be completed. China has already announced publically a grand plan for the development of a manned space craft in the decade of the 1980's; however, the number of launches planned is not great. At present, the Chinese are in the midst of doing research on adding a liquid oxygen/hydrogen fuel third stage onto the CSS-4. They intend using this vehicle to launch communication satellites and weather satellites into stationary orbits. Low altitude meteorological satellites are already planned for the first half of the 1980's along with manned spacecraft.

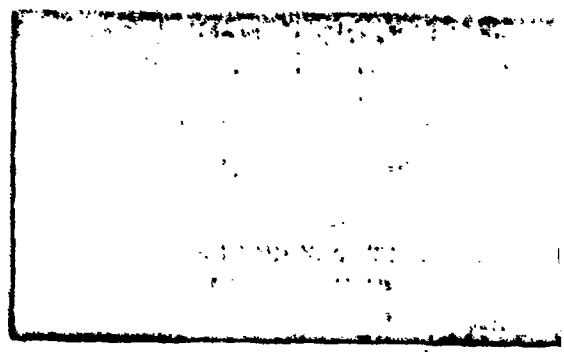
It has often been reported that the Chinese were in the midst of test pro-

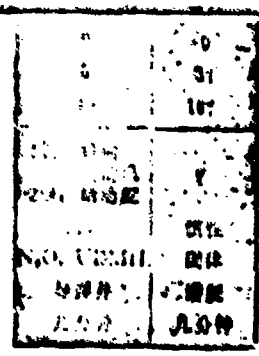
ducing a large-scale solid fuel rocket. The purpose of this rocket is supposed to be development for launching from submarines (BLEM). However, at present this objective is in need of massive expenditures of capital, and the making of submarines which can operate safely while deployed in certain waters along with making the missiles aboard capable of hitting their principal targets in the Soviet Union as well as difficulties in the area of communications and related matters all make large scale deployment of this type of missile very difficult. A system which is relatively more useful in practical terms is a land based missile which is mobile and of intermediate range. This system is deployed in Xin Jiang, has a range of approximately 4000 km and poses a real threat to the heartland of the Soviet Union.

The nuclear strengths of France and China are similar in many ways. The scope of their capability is about the same as that of China, and both countries are bending every effort to create a deterent force the objective of which is to destroy the monopoly of the super-powers in advanced technology and numbers of strategic weapons. However, at present, the real state of things in China is relatively weak. The Chinese would have a great deal of trouble thinking in terms of a first strike, and one cannot say for sure if China actually possesses a credible deterrent. Because of this, China fervently hopes that she will be able, after the 1980's, to deploy various types of land, sea and air based missile systems in order to strengthen this type of deterrent.

(Note: Fig 2 is unreadable except for a few words. A translation of what can be made out of Fig 3 is included on the following page.)







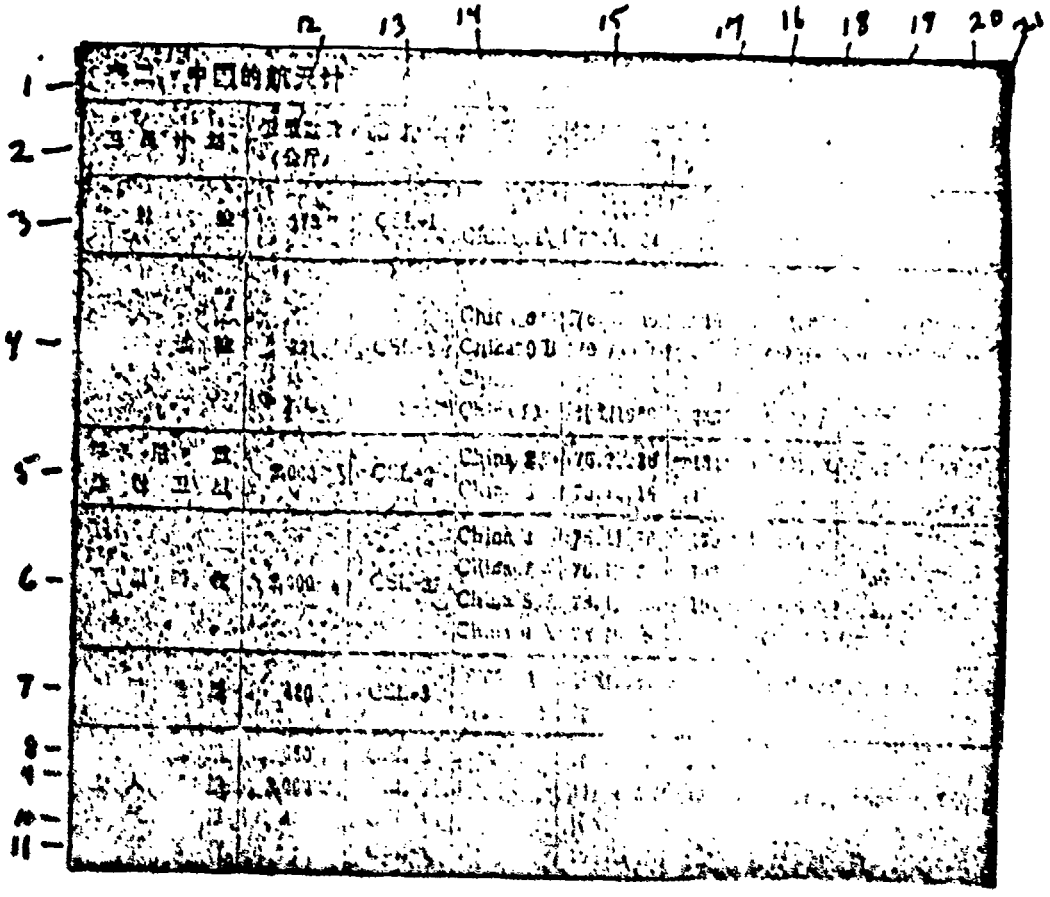


Fig 3

1. Table II China's Space Program (This table represents a guess by its author at the satellite program of China. It was originally carried in the International Defence Review) 2. Satellite Program 3. Launch Tests 4. Technical Tests 5. Military Weight (one character unreadable) Satellites 6. Satellite Recovery 7. Communications Satellites 8. Meteorological Satellites 9. Manned Spacecraft 10. Atmospheric Satellites 11. Space Flight 12. Weight of Satellite (kg) 13. Launch Vehicle 14. Launch Designation 15. Date 16. Orbit Parameters 17. Nearest Point (km) 18. Farthest Point (km) 19. Period (minutes) 20. Angle of Inclination (The rest is unreadable.)